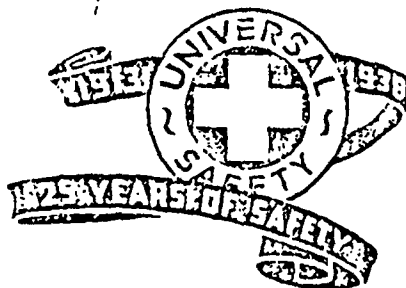


TRANSACTIONS

SILVER Jubilee SAFETY CONGRESS

CHICAGO
OCTOBER 10-14,
1938



NATIONAL SAFETY COUNCIL, INC.

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Preface

THE Transactions of the Silver Jubilee Congress and Exposition of the National Safety Council, October 10-14, 1938, are published in two volumes. Volume I contains the general and subject sessions and the sessions of the various Industrial Sections. Volume II contains the Street and Highway Traffic, the Commercial Vehicle, the Transit, the Child Education, and the Home Safety sessions.

Volume I is distributed automatically to all industrial members of the Council. Volume II is sent to members who are believed to be interested chiefly in the sessions it contains. However, other Council members may obtain Volume II upon request.

Many members have found it of benefit to distribute copies of the Transactions volumes to both executives, foremen and supervisors, who have used the practical information they contain in safety programs and for general reference purposes. Extra copies of the Transactions may be obtained as follows: One to 10 copies of Vol. I, at \$2 each; 11 or more copies, \$1.75 each. Extra copies of Vol. II cost 75 cents each.

THE Transactions are a condensed record of the proceedings of the Silver Jubilee Congress. The papers and addresses have been edited to delete extraneous matter, abbreviate the less important portions, and emphasize what may be of particular usefulness and value in promoting effective safety organization and other accident prevention measures. These volumes, therefore, are a somewhat abridged version, compact, practical and of particular value to the student and executive interested in achieving more thorough accident prevention success. The original manuscripts are available for additional reference, if desired, in the files of the National Safety Council.

THE National Safety Council, at its Congresses, seeks to eliminate from discussion matters which are not pertinent to the aims of the Congress or which may be contrary to the Council's policies. It cannot accept responsibility, however, for all views expressed either in the papers which have been delivered or in the discussions based upon these papers.

NATIONAL SAFETY COUNCIL, Inc.
20 North Wacker Drive
Chicago

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Occupational Disease

THURSDAY MORNING SESSION

October 13, 1938

The session for the discussion of outstanding problems in the field of occupational disease was called to order by the Hon. P. J. Augsten, Chairman, the Illinois Industrial Commission, Chicago, who pre-

sided. The Chairman emphasized the importance of the selected subjects to be presented by eminent speakers, and promptly introduced the first scheduled speaker.

The Trend of Occupational Disease Legislation

By HENRY D. SAYER

Manager of the Casualty Department, Association of Casualty and Surety Executives

Let us consider the differences between the accidental injury and the occupational disease. For these distinctions are important and must constantly be borne in mind when we consider either legislation on the subject of disease, or engineering methods of prevention or control.

Generally speaking, accidents occur at a specific moment in point of time, and, from the standpoint of fixing liability under any policy of insurance, it is in the future; that is to say, at the moment of the acceptance of liability under any insurance contract the accident for which liability may be assumed has not yet happened. That frequently is not so with the occupational disease. Insurance by its very nature can only assume liabilities that have yet to arise—not those that have already accrued.

Again, speaking generally, the industrial accident is something that can be seen—even though unforeseen. It may be visualized and described in words, setting forth specifically the time, place and manner of happening. It can then be determined, after the happening of the event, whether it was preventable or inevitable; blame, if any, can be assessed; the worker involved, or his foreman or superintendent, can be shown the fault, and effective measures can be taken to guard against a like future happening.

But some will say, truly, not all accidents happen in the manner described; that not always are they held to occur only at a specific moment or under circumstances where they can be visualized and described. By administrative and court decisions, it is true in some jurisdictions that the definition of "accident" has been greatly broadened. We find the entrance of disease germs into the human system without visible trauma, with resulting sickness or death, and even the specific time and place not definitely known, except that it is shown to have probably occurred in the employment, being held to be an accident.

Others vs. Hull, 178 App. Div. 356, 161 N.Y. 767, an anthrax case; *Vennon vs. New Oil Company Co.*, 161 Wis. 370, a typhoid case, and others.)

Poisoning of the body through the effects of a deleterious or toxic substance used in the employment, the dangers of which were unknown to the worker, the employer having been negligent in safeguarding properly the use of such substance, has been held to be the result of an industrial accident.

Victory Sparkler & Specialty Co. vs. Francks, 147 Maryland, 368; and the very recent case of *Black vs. Cresion Auto Co.*, Iowa Supreme Court, August 5, 1938, 281, N.W. 189.)

And where negligence of the employer has been shown, an injury to health, even though not occurring through a happening at a given time and place, but by repeated

asures over months of time, has been to be an accident.

See, e. g., Croshaw Ash-tos Co., 206, North China, 198, in Ash-tos case.

se and other cases I might cite are exceptions and not the general rule of what constitutes an accidental injury. I think we may fairly assume that the efforts of administrators of the law and courts have been directly inspired by belief in the necessity of finding a remedy for an industrial ill for which no remedy had been provided by specific language of the statute. May we consider this as straws in the wind, showing a trend toward industrial disease liability? I have observed that the tendency of the courts is to construe the term "accident" in a more limited manner in those states where there is specific provision in the law covering occupational diseases. Thus, we find clear instances of what has been called "judicial legislation," that is, the broadening the meaning of the law over situations not clearly included in the terms of the law by the duly constituted legislative authorities.

Let us now consider what we mean or imply by the term "occupational disease." We find a more difficult field—difficult at the standpoint of administration and at interpretation; and difficult from the standpoint of the doctor and the employer.

What is disease? We think we know, and yet to laymen the term conjures up in their minds something of a rather definite nature. When we pause to consider it, however, we find infinite qualifications of the term to us, and we are confronted with conditions that fall into the zone of uncertainty—such as, for example, whether hereditary is a disease. At any rate, we say it is a normal condition, and let it go at that.

When we come to add to the doubt the term "disease" the even more indefinite "occupational" or "industrial," we find ourselves in an area of highlight surrounded by a vast and increasing zone of twilight leading off into Erebian night. How then shall we define the term "occupational disease"?

Occupational diseases stand out in our minds as clearly and definitely occupational. As to hereditary diseases, we have no great difficulty, either leg-

islatively or administratively. These include the well-known metallic and chemical poisons that are so definite and characteristic a part of some industrial processes. Were the diseases arising from the use of these substances the only occupational diseases with which we need concern ourselves, the legislative difficulty would be largely removed, and we could safely entrust the problem to the doctor and the engineer.

But we have seen that the legislative problem is not so simple. Nor is it simple administratively. We find ourselves floundering in a veritable morass, either because of the inherent difficulties of the situation, or because we have not or cannot agree on our objective. If all parties would recognize the difficulties and the limitations on what industry can do, or can fairly be expected to do, we could much more confidently face the future. If we could agree that provision for "occupational diseases" is not synonymous with general health and life insurance for industrial workers at industry's expense, then I am sure we could get somewhere very definitely.

But has there not been too much loose thinking on the subject? We are met with a curious situation. We find the advocates of so-called "all-inclusive" statutory coverage deliberately seeking indefiniteness. This is unlike them, for when they know what their objective is, and are willing to disclose it, they have not refrained from pressing their advantage with definite and specific purpose, and with exact language to accomplish that purpose. That, at any rate, is correct legislative procedure.

But in this field, even where the liability of the employer is made inescapable, the constant suggestion is put forth that it is futile for the legislature to attempt a definition or delimitation of occupational diseases, and, therefore, words of the most general character should be employed, leaving to the courts the interpretation of the law as they see fit. I submit that it is not the function of the courts to make up the legislative mind; that is the function and the right and the duty of the legislature. Nor should the legislature seek to avoid and evade responsibility by transferring to courts and commissions the determination of questions of liability which the legislature finds too difficult for it to determine for itself.

To effect coverage under the compensation law, therefore, by any such general and vague language as the term "any and all occupational diseases," or by adding to the definition of "accidental injury" the phrase "and shall include occupational diseases," is to create an uncertain liability—one that may require endless and perhaps disappointing litigation before the meaning of the law is established, and will most certainly be a disservice to workers and employers.

An excellent rule—a cardinal rule—in statutory drafting, is to use words of definite, certain and understandable meaning, used in their common acceptance, rather than to resort to vague, uncertain and meaningless words, or words the meaning of which may have the effect of distorting the objective that is sought. Controversy is bred by uncertainty of language, and controversy leads to litigation in courts. Litigation is expensive for all parties; it causes delay; and it frequently causes bitter disappointment. It breeds rancor. It may even breed disrespect for the law and for the orderly process of government.

Why then should there be this continuing demand for the all-inclusive coverage? Is it with the vague hope that satisfaction may result in some cases of misfortune to workers who fall victims of the disease that besets us all and lurks in waiting for us in our play, in our homes, yes, and even in our sleep, as well as in our employment? Perhaps not yet if that were the design, a more simple way of succeeding in it could not otherwise be contrived.

Are we to understand that any disease of the most common and ordinary risk of life may become an occupational disease if its source or supposed source had its origin in an incident of the employment or a condition thereof present, or if claim was made that a pre-existing disease had been aggravated by such condition? That is a large order. It would mean that industry would become liable for any ordinary disease of life, provided that disease could be, with a show of plausibility, related to a condition or incident of the employment. Such diseases are almost too numerous to enumerate.

But we know that claims have been made for tuberculosis and heart disease, the two most numerous diseases and the cause of more deaths than any two other diseases.

Add to these pneumonia, asthma, arthritis, rheumatism, and a host of others; and we discern in this the beginning of a system of health insurance of the most costly type—a system moreover that would discriminate bitterly against the many millions who contract such diseases in perhaps actually the same way, but who have to continue employment at all against which to assert liability. Should not the man who falls victim to a disease of ordinary life while searching for a job be just as much the concern of the state as the man who becomes disabled from the same disease and who is so fortunate as to have a job?

Let us be realistic about this thing called health!

Ill health is a deviation from the normal. But what is "normal?" How great a deviation is abnormal? Disease is of many and varying degrees. To what extent does the mind affect the working status? Or what part in the situation is played by "will power"? These are not fanciful questions, they are encountered and will obtrude themselves continually in determination of compensation for disease where we depart from the known and characteristic occupational diseases.

From these remarks perhaps some will say we are opposed to coverage of occupational diseases under compensation laws. Not so! The stock casualty companies represented in the Association have not opposed and do not oppose the principle of compensation for occupational diseases, if thereby is meant compensation for those diseases that arise from a "trade risk," or from conditions that are normally and usually present in the particular employment, as distinguished from those ordinary human ills that beset all of us. Our view of it is that the policy of coverage under the law is a matter of local concern, to be determined by local legislatures in the light of local demand and with due regard to local opinion of both labor and industry.

No employer in this age can reasonably object to fair compensation for disease arising from such occupational risks, any more than he can object to reasonable compensation for disabilities due to accidental injuries.

This conception of industry's obligation is, however, quite different from the conception of a public obligation to care for

al compensate for all sickness and death under a form of health and life insurance. The latter obligation, if it be a valid one, is the obligation of the state and the nation, not the obligation of industry alone.

The reasonable, the intelligent, the sane, ask for industry to discharge its obligation to its workers for conditions of health. It is to provide for the greatest reasonable requirements for industrial hygiene, and to provide compensation only for those conditions that arise from specific named diseases that are truly occupational, characteristic of, and peculiar to the processes in which the worker is engaged.

Industry will, I am sure, meet the challenge of the occupational disease problem, if it is presented under a law that prescribes the liability of industry in understandable terms. In the early days, the general rule was to include occupational diseases in the compensation law by specifying the particular diseases or the particular conditions leading to diseases that are deemed to be occupational and compensable, as we call a "schedule" law. It is this in which compensation for occupational diseases is covered in all of the countries of Europe and of South America.

It is so simple, it is so sensible; it is easily administered, that the wonder is not the acceptance of the principle is not universal.

But we will keep ever before us the principle that a disease, to be deemed occupational, must be "characteristic of and peculiar to" the occupation, there should be great difficulty in arriving at a proper statutory setup for the coverage of all true occupational diseases. Metallic poisonings characteristic of occupations in which metals are used. The diseases characteristic of chemicals, of acids, of alkalis, and fumes, are characteristic of and peculiar to those occupations in which the workers are so exposed. The diseases of the respiratory system, due to the inhalation of dusts, are the natural accompaniment and the characteristic effect of work with dusts.

When such clear and specific language is available, why should we be asked to use such broad terms, the use of which may frustrate the giving of a blank check by the legislature? If the purpose is not to charge industry with diseases which are not char-

acteristically the obligation of industry, why continually insist upon the use of language which is susceptible of misinterpretation? Be well assured, if legislatures do not perform their duty and lay down clear definitions of liability, industrial boards and commissions cannot in the presence of the widows, orphans, and industrial cripples, be expected to exercise greater courage than the legislatures. The law in the hands of such an administrative body will be scanned, and I fear scanned in vain, for limiting words or language to stay the hand of industry's self-constituted almoner.

The legislative trend, I am happy to report, in recent years has been toward the definite, rather than the indefinite. Despite tremendous pressure, no legislature has, in the past three years, adopted a blind, "all-inclusive" occupational disease law, except New York, of which I shall speak more in detail presently. Michigan, Rhode Island, Pennsylvania, Delaware, North Carolina, and Washington, among the states most recently enacting occupational diseases laws, have adopted the "schedule" or "specific" method of coverage. Two years ago, Ohio amended its scheduled occupational disease law by adding dust diseases to its existing schedule. In two other states, namely, Illinois and Indiana, occupational disease laws have been enacted in general terms. However, in identical language, these two states have undertaken to limit and define occupational diseases and have attempted therein to safeguard industry against liability for the diseases of ordinary life.

Although doubtless familiar to many, the definition in the laws of those two states will bear repetition, as indicating the extreme of difficulty in attempting to exactly define an occupational disease.

"See 6. In this Act the term 'Occupational Disease' means a disease arising out of and in the course of the employment. Ordinary diseases of life to which the general public is exposed outside of the employment shall not be compensable, except where the said diseases follow as an incident of an occupational disease as defined in this section.

"A disease shall be deemed to arise out of the employment, only if there is apparent to the rational mind upon consideration of all the circumstances, a direct causal connection between the conditions under which

the work is performed and the occupational disease, and which can be seen to have followed as a natural incident of the work as a result of the exposure occasioned by the nature of the employment and which can be fairly traced to the employment as the proximate cause, and which does not come from a hazard to which workmen would have been equally exposed outside of the employment. The disease must be incidental to the character of the business and not independent of the relation of employer and employee. The disease need not to have been foreseen or expected but after its contraction it must appear to have had its origin in a risk connected with the employment and to have flowed from that source as a rational consequence."

Under this definition no industrial manager can, with any assurance, be informed what his obligation is to his workman, and assuredly no workman suffering from disease can surely know whether he is entitled to compensation under that law. Of course, as is to be expected, litigation over the interpretation of this definition is already in progress in both of these states. And situations will arise constantly in the future where the facts will be such that only litigation in the courts will determine the liability of industry, or the right of the worker to be compensated.

The claims actually filed with the Industrial Commission of Illinois already include undulant fever (a disease said to be commonly communicated by milk and meat products), tularemia, rheumatic fever, arthritis, rheumatic heart, heart disease, amebic dysentery, varicose veins, flat feet, athlete's foot, cerebral hemorrhage alleged to be due to overwork, syringomyelia, and nerve disorder. I have not mentioned the claims for characteristic occupational diseases, such as silicosis, carbon monoxide poisoning, and the various other toxic conditions which clearly come under the Act.

I have referred to the fact that New York, alone, has in recent years enacted a law covering occupational diseases in general terms. New York was the first state, I believe, to enact an outright compensation law for occupational diseases. It did so in 1920. The law was a schedule type law. (It so happens that I had the privilege of being one of those who collaborated in the drafting of that law.) We were dealing with a

new subject. We examined the existing laws in other countries and adopted the form that seemed best adapted to our conditions, namely, the English law on occupational diseases. The schedule was, from time to time, enlarged as new industrial processes developed new diseases. By 1920 the schedule had been enlarged to include every disease that was a potential hazard to the workers in New York State, with the single exception of the dust diseases of the lungs. In order surely and certainly to bring such conditions within the purview of the law, there was enacted an additional item in the schedule, reading "any and all occupational diseases." The schedule was not repealed, and the administrative provisions in the law with respect to the schedule were continued. One of the first questions that arose under this new law was whether the new classification superseded the schedule and the limitations set forth therein, or whether it was an addition to the schedule and applied only to those conditions not previously included therein.

The legislature, having evaded the duty of defining the term "occupational disease," the Industrial Board, which administers the law, adopted a definition. That definition is well worth repeating: that the Board deems a disease to be occupational only when it is "characteristic of and peculiar to the trade, employment, or occupation" in which a worker was engaged. This definition was adopted almost verbatim in the Rhode Island and Michigan Laws. The Appellate Division of the Supreme Court, however, declined to follow it, and by a vote of three to two, held that any disease that arises out of a condition incidental to the employment must be deemed to be an occupational disease.

(*Bishop vs. Comer & Pollack*, 251 Appellate Division, 492; *Goldberg vs. 951 Marcy Corporation*, 251 Appellate Division, 901.)

The Goldberg case was appealed to the Court of Appeals—the court of last resort in New York. So completely do the facts in the Goldberg case bear out what I have said about indefinite liabilities under an all-inclusive law, that they will bear repetition. Shirley Goldberg was employed to sell tickets in a moving picture theater. Her booth was on the sidewalk. It was kept heated, in cold weather, by a small electric heater, operated from a

ooth. She contracted what she described as blotches or a rash on her legs. The blotches or rash she claimed were due to alternate heating and chilling of her legs when she switched on or off the heater. They did not constitute a disability. However, on complaint to her employer, she was told to see her doctor. While on her way to see her doctor, on her own time, she slipped on the sidewalk and fell, fracturing her ankle. Although the day was cold and testified there was ice and snow on the sidewalk, the claimant alleged that she fell solely due to weakness resulting from these blotches, and the Industrial Board found; and found that the cause of the fall was an occupational disease, characteristic of and peculiar to her employment.

The Court of Appeals, in an opinion that distills with logic and sound sense, struck us free-for-all system from the language of the New York Act. They unanimously refused to concede that this was an occupational disease. To make every disease at once out of and in the course of employment compensable as an occupational disease, they said, would be to make the compensation law "the equivalent of life and health insurance." The court further held that to be "occupational," the disease must be one which "results from the nature of the employment"; and that by nature of the employment is meant—conditions of which all employees of a class are subject of which attach to the occupation—"a hazard which distinguishes it from the usual hazards of occupations, and is in excess of the hazard attending employment in general."

Goldberg v. 934 Macy Corporation, decided January 11, 1918, and reported in 276, N. Y. 113 (12 N. E. 2nd 311).

Thus, after more than two years of great uncertainty as to the meaning of the act, the Court of Appeals has eliminated from the New York Statute the diseases of ordinary life which are only incidentally or speculatively related to the occupation.

Just a word about hernia as an occupational disease. Never heretofore regarded as an occupational disease, but quite generally recognized under certain circumstances as an accidental injury—the Occupational Disease Law of Michigan, enacted a year ago, specifically included hernia in its schedule of diseases. Not all hernias, however, are so included, but only those of recent origin, as to which dis-

ability follows immediately, and in which prompt report to the employer is made. This is not far different from the rule in regard to hernia as an accident. But in New York, during the past year, it has become somewhat the fashion to regard almost every hernia as either an accident or an occupational disease.

This followed on a decision of the Court of Appeals, sustaining an award for hernia as an occupational disease wherein the Industrial Board specifically found that no accident had occurred. In the case presented, the worker was required, in the course of his employment, at frequent intervals, to rotate his body on the hips. This man was employed in a glass factory. He gathered molten glass on the end of a punny, which he, in turn, swung about and placed in a mold. The weight was not excessive, being only a matter of a few pounds. In affirming this award, the Court of Appeals said:

"The finding, supported by evidence, is that the continuous gathering and lifting of glass from a furnace involved a constant twisting and straining of the body. This process, from gradual stretching, resulted in a hernia which is a disease (*Matter of Alpert vs. Powers* 223 N. Y. 97, 101.) There is medical testimony that claimant's occupation would produce this disease and there are judicial decisions in other jurisdictions holding that hernia is an occupational disease (*Marathon Paper Mills Co. vs. Ind. Comm.* 203 Wis. 17; *Travelers Ins. Co. vs. Locke* 56 Fed. (2nd) 413, 444)."

(*Foster vs. Giffender Brothers Inc.*, 278 N. Y. 318 16 N. E. 2nd 369.)

Perhaps the most controversial question involved in occupational disease legislation is the treatment of liabilities for dust diseases of the lungs. In no class of cases is the marked difference between accidents arising at a given time and place and occupational diseases more pronounced. In this category of cases, we find silicosis, anthracosis, and asbestosis, all of them forms of pneumoconiosis. While these diseases in some of their forms are among the most ancient, their ravages having been recognized generations ago, little has been known until recent years of their causation, of their pathology, and of their complications with other diseases. A vast fund of knowledge of these diseases has been gathered in the past ten years, and intense

studies of their etiology and pathology are still going forward.

One fact stands out clearly, and that is, that these diseases do not progress to the point of disability until after many years of exposure to dust. The length of time, varying from five to twenty-five or more years, is dependent in large measure upon the concentration of dust, the composition of the dust, the time actually exposed during working hours, and the individual susceptibility or resistance of the worker. Another fact that stands out is that the fibrosis of the lungs, once acquired, is permanent and incurable, and, in uncomplicated cases is not susceptible to medical treatment.

Many thousands of workers today, under no law but the common law, have been employed in employments exposing them to more or less heavy concentrations of dust for many years. In the event of the enactment of an occupational disease law including those diseases, industry will find itself, at the stroke of a pen, liable for conditions already acquired through long years of employment, and which may become disabling at any moment. In this situation, the best guaranty against disablement is continuous and steady employment. Many a man, actually able to work and earn good wages, while he has a job, will be able to demonstrate by x-ray and clinical examination the presence of a marked degree of silicosis, when his job stops because of depression or otherwise.

Hence arises the question of the so-called "accrued liabilities." This term which has come into common use is perhaps not an exact term, in that "liability" does not occur until disablement, and the liability is only "accrued" at that time. What we have in mind when we discuss accrued liabilities is the condition of fibrosis of the lungs which has accrued and has been acquired over a period of years. This condition, being permanent, remains with the worker, whatever and wherever may be his employment. Perhaps a more exact expression would be "potential liabilities," and yet they are more than potential; the condition giving rise to them is actually existent.

Industry tells us quite truly that it cannot now pay full compensation out of current income to all of the men employed in

industry who may have in the past incurred some degree of fibrosis of the lungs. But if industry cannot assume these liabilities, how much less justification is there to call upon insurance, out of the premiums of next year, to pay for disabilities acquired over the past fifteen years, and for which it received no premium?

In this difficult situation, it has been found necessary in many states, if employment is to be continuous and uninterrupted, and if men are eventually to be compensated for the fibrosis acquired due to future exposures, to absorb, to a great extent, industry from the obligation of compensation for past exposures, and to base compensation upon the extent of exposure after the enactment of an occupational disease law. Thus, there has come into acceptance in several states the principle of graduated compensation benefits for dust diseases, limited to future exposures, and eliminating in large measure the exposures of the past.

Under this system compensation for disability or death occurring during the first month under the new law would be only a nominal amount (it has been set as low as \$500 to start with). A person disabled during the second or third month after the enactment of an occupational disease law will have been exposed, to a small extent at least, under that law. The exposure is perhaps in itself insufficient to actually result in any harm. But the maximum benefits will be increased, month by month by small increments, until in the course of two or three years the full limit chargeable to industry in the particular state will have been reached. This system is not so complicated as it might seem.

The effect of it is rather to postpone the going into effect of a dust disease law for a matter of two or three years, and experience under this law has demonstrated that few claims arise where the compensation benefits are so limited, the workers preferring to stay at work as long as they can. It may be said that it works harshly in the case of the person who becomes really totally disabled in the early months of law. When measured by the liability with which the employer may fairly be charged, it does not, in fact, work a hardship, and when compared with the existing system in states not now under occu-

national disease laws, it not only is not a hardship but is, in fact, a great boon.

The principle of limited and graduated liability of the employer for dust diseases has been recognized by enactments in New York, Michigan, Pennsylvania and Ohio. An unusual provision has been adopted in the state of Washington, providing under their schedule form of law that the cost of compensation for occupational diseases shall be divided equally between the employer and his workers, and deductions shall be made from the employees' wages as contributions toward the insurance premiums involved.

But what, you may say, has all this to do with the safety engineer?

It has much. The safety engineer can no longer regard himself as doing his job if he seeks only ways and means to eliminate the industrial accident. The industrial hygienist must become the colleague of the industrial engineer. Medical science must give intensive thought and study to determining the effects upon the human system of various industrial processes, and exposure to various materials therein. All exposures cannot be eliminated and still have industry perform its functions. Most important, therefore, is the medical determination of what are safe limits in exposures—the so-called "threshold limits." The engineer cries aloud today for expert medical guidance on this subject. Armed with such medical opinion and advice, the task of the engineer then is to devise practical ways and means for attaining conditions where such threshold limits apply.

Every industry presents a problem or series of problems in itself. No two industries are exactly alike. What is tolerable in one may be intolerable in another. What is good practice in one industry may be totally inapplicable for practical reasons in another. The task of the engineer then is to find how right principles may be made applicable.

Industry today, more than at any time in its history, must bear the burden of responsibility for the health as well as for the safety of the industrial worker, and if his health and his safety are adequately safeguarded his happiness and the happiness of those about him will be increased. Therefore, it is of prime importance in the field of safety that intensive and increasing in-

terest must be given to industrial health.

The care for the health of the worker must not be confined to the guarding against those conditions that are mentioned specifically in the law. The engineer's responsibility is a broader responsibility than is the legal liability for compensation. There can be no doubt that the enumeration in the law of specific conditions for which liability is absolute will be of great advantage to the industrial engineer in seeking to enforce proper health standards. It is far easier for him to obtain approval of his recommendations, if he can point out to management that the use of benzol or some benzol derivative is specifically mentioned, and point to the specific paragraph in the law that cites the liability of the employer for that condition. No argument is needed to convince management of its obligation in such a case.

The same is true with regard to all of the metallic poisonings and all of the other wide range of chemical exposures. Psychologically there is great power in the printed word, and even the most backward management may be made to respond when the clear mandate is set forth in the law. Not so easy will it be, under a general, vague, and all-inclusive occupational disease statute, to convince management that it has specific duties with regard to the elimination of health hazards. Thus, we see there is another and potent argument for the schedule law, rather than the all-inclusive law.

There is perhaps yet another and even more compelling reason for applying the rule of sanity and common justice to legislative mandate in the complex field of occupational disease. Shall employment be limited to those who are physically perfect? All humans are not examples of physical perfection, nor can we by legislative fiat reverse the laws of nature which immutably decree that we shall grow older with the passing years.

We have seen and discussed the dangers inherent in the all-inclusive theory of stretching the law to cover every sort and condition of disease, and to try to make them employment-related. When that stretching is complete, when administrators of the law find it easy and possible to burden industry with the responsibility of health insurance under the guise of an occupational disease statute what of those

who, wanting employment or seeking to retain it, are not physically perfect yet certainly are not disabled?

Much is heard today of the dread forty-year-line for employment. Whatever the facts may be as to that, is it not possible—if not probable—that industry, in desperation and against its desire, will be forced eventually to accept only those among whom the health hazards are least uncertain—the physically perfect, the young and the strong? We may well pause to con-

sider the devastation such a situation would produce.

In the interest of all workers, the young and the old, the perfect and the imperfect, let us not embark upon legislative policies that can lead only to enlarging the field of unemployment, and to closing the door of industrial opportunity to those skilled and faithful workers who, having passed the meridian of life, are subject to those natural infirmities and ills of the flesh to which all men, in time, must bow.

Handicaps in the Diagnosis of Occupational Diseases

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It is a popular medical belief that occupational diseases are far more difficult to recognize and precisely to class as such than any other type of disease state. So firmly is this idea rooted in the minds of some physicians that they argue that occupational diseases never should be made compensable because of extraordinary diagnostic difficulties.

Lately, Kettering has said, "The doctors tell us there are certain diseases that are incurable. Do you know what an incurable disease is? It is one that the doctors don't know anything about. The disease has no objection to being cured at all."

This may be paraphrased by saying: There are no undiagnosable occupational diseases. The only ones that appear undiagnosable are the ones the physicians have not learned how to diagnose. No occupational disease has ever offered any resistance of its own to being diagnosed. The disease is perfectly willing to be diagnosed.

At least one-half of all occupational diseases are almost self-diagnosing, particularly when arising in groups; the remaining half present no greater difficulties than attend the diagnosis of some other classes of diseases. To maintain that occupational diseases are beyond the diagnostic skill of the physician is pure defeatism. With equal propriety, it might be suggested that all neurology be abandoned because the majority of conditions arising in this field may not be diagnosed with ease.

While it may be said that there are no

undiagnosable occupational diseases, it must be recognized that many remain undiagnosed, or more often misdiagnosed. The prime reason for this is that the usual physician sees only small numbers of any one type of occupational disease. Taking Ohio as a typical industrial state, the total number of occupational diseases, compensable and otherwise, reported to the State Department of Health during the year 1937 was 1,600. On the other hand, there are in this state 9,200 physicians. Thus, only one occupational disease arose for every 5.7 doctors in the state.

Here then is the foremost handicap to the recognition and diagnosis of occupational diseases and at the same time a back-handed compliment to industry. Industry, because of its prevention achievements, has so limited the number of occupational diseases that day by day the physician is ordinarily not spurred to the possibility that any worker who seeks his professional guidance may have a disease of occupational origin. Here, too, is the fundamental reason why more medical schools do not develop training departments in the field or organize special hospital service for the care of occupational disease patients.

While there are reasons for rejoicing that there are comparatively so few occupational diseases, we should recognize that there are specific situations which introduce diagnostic difficulties. A number of these are now presented, as separate entities.

Definition and Terminology

Much confusion is caused by lack of uniformity and clarity in definition. Scarcely any two states in their statutes accept the one definition of an occupational disease. In a few states, hernia is by law specified as an occupational disease. However, in the majority of states it is, when related to industry as a cause, classed as a traumatic injury. In a few states, the definition of an occupational disease provided by statute is such that certain items later appearing on schedules themselves do not conform to a definition furnished.

Well meaning legislators might enact a law declaring that two and two make seven, or that the mathematical facts still might remain otherwise. So with legislation involving occupational disease diagnosis, there may be demands for legal acceptance of certain conditions as occupational diseases, when elementary medical facts point otherwise. One group of physicians may reserve the term "injury" for exclusive use in connection with trauma, while another with propriety may assert that occupational diseases of many natures represent "injury" to the same extent implied by the term "traumatism".

Let us consider, for example, the occurrence of an accidental injury or the one and a clear-cut occurrence of an occupational disease on the other, both caused on one and the same substance, but under different circumstances. It might come out in a given factory that a workman entered a tank car, lately emptied of benzol, and in the absence of suitable protective and precautionary measures might, within ten minutes, become asphyxiated as result of breathing benzol vapors. Manifestly, such an occurrence as this would be accepted as an accidental injury and no compensation board would ever raise a question that such was not the case.

On the other hand, this same benzol, if from this tank car, might be utilized in this same factory in some productive operation, giving rise to benzol vapors. Day by day, another workman might inhale some of these vapors. In due course, this workman might produce the usual and characteristic features of that occupational disease known as benzol poisoning. Here it is most unlikely that any physician or compensation board would entertain any

uncertainty that this condition represents a characteristic occupational disease.

Between these extremes, there is some point at which difficulties would arise in distinguishing occupational diseases from accidental injuries. This same situation applies to many other substances and many other occupational diseases. There is perhaps no warrant for any attempt at a hard and fast demarcation in terms of time, indicating where an accidental injury exposure leaves off and an occupational disease exposure begins.

However, there may be some justification for the practice of many physicians, who hold that if the exposure leading to damage is less than one work period, the ensuing injury should be recognized as an accident. Conversely, if the exposure period extends for more than one work period, then the resulting damage may with propriety be accepted as an occupational disease. In general, it may be claimed that one of the disturbing handicaps to uniformity, clarity, and precision in connection with occupational disease diagnoses stands in relation to awkward legal situations, inadequate definitions, unsuited classifications and such.

Fallacious Medical Histories

As a result of careful training, every physician is disposed to attach significance to the history statements given by a patient or members of his family with regard to any disease. The less a physician may know about the possible etiologic factors in any situation, the more consideration he is likely to give to history statements. It is human nature to associate all of our ills with some particular happening or series of happenings. A cold may be associated with a particular period of sitting in a draft. A gastro-intestinal upset is prone to be associated with some particular alcoholic bout or food engorgement.

In the case of industrial workers, there is an especial proneness to associate any bodily ailment with some aspect of work. Inasmuch as almost every workman hopes, openly or secretly, that any and all diseases from which he may suffer may be laid at the door of his employer, he is most likely to stress and emphasize the high probability that this condition unfailingly was produced by the chemicals, gases, vapors, dusts, etc. that attend his work oper-

ations. This does not necessarily represent dishonesty or cupidity on the part of the patient and only may involve those human frailties shared by all of us.

No less, the history statement may unduly influence the physician in his diagnosis, may lead to misdiagnosing, may pave the way for unwarranted claims or law suits without any evil intent on the part of the physician. It is most unfortunate that the physician is all too often unable to appraise the worth of work history statements provided by a patient. Let us, for the moment, assume that a specialist in ear diseases is visited by a patient on account of deafness. In connection with the history, the physician may record that this patient is a drop forge operator. The physician may go ahead and make many careful examinations, looking for the cause of the deafness, from infection, from syphilis, from heredity, etc. If, however, he had obtained a complete work history, and was in position to evaluate this work history, he might come at once to know that this drop forge operator is perhaps exposed to as much noise and concussion as ever arises in ordinary industrial work and that the deafness present clearly is an occupational disease, resulting from sustained noise exposure.

It may be asserted that well meaning physicians, without any evil intent, through their misunderstanding of patients' descriptions of work operations have become responsible for a high percentage of the large number of unwarranted suits that have flooded the country in recent years. In short, one of the handicaps to the proper diagnosis of occupational diseases is to be found in the attaching of undue significance to the patient's statements as to work conditions, when the physician himself is unable to appraise their reliability and merit. Some physicians need to make themselves more remote to the fallacy that just because a workman is employed in a dangerous trade, inevitably any ailment must necessarily be the result of work exposure. There still may be a few persons who may believe that lead poisoning may arise from work in making lead pencils.

Time as a Handicap in Diagnosis

Too often the physician well qualified in the field of occupational diseases, does not see the patient or claimant whose condition

is to be appraised until long after that time within which the disease might have been diagnosed with precision. Without any purpose of condemning or finding fault, the fact must be faced that in many instances the decision of a patient to blame his ailment on work causes was not made within that period when some or all of the characteristic manifestations were present.

Then, at some later time, a physician qualified in occupational disease work may be called upon to examine the claimant or to reach a decision based upon the examination of inadequate records of another physician who himself did not carry out any examinations with particular reference to that occupational disease for which a claim later has been filed. This is asking too much of the diagnostic ability of any good physician.

On the witness stand, the charlatan always makes the better impression on a jury, because he is unhampered by the caution and reserve that guide the upright witness. Being positive is often merely a matter of being wrong in a loud voice. The point is that the time to make a diagnosis of an occupational disease is that period during which the disease exists. Otherwise, the most accomplished physician may be placed in an unfortunate position in the reaching of his decisions.

Insufficient Training and Experience

An outstanding drawback to the proper diagnosis of occupational diseases may be found in inadequate training in medical schools for this aspect of medical work. This is not a thrust at the doctor, nor may any complaint be made against medical education today. It may not be expected that medical schools will markedly enlarge an already over-crowded curriculum to provide extensive instructions with reference to occupational diseases when the number of cases yearly is so small as to provide only one for every five or six physicians. Realizing his own shortcomings in this field, a good general practitioner may honestly shun this type of work, but this step on his part may eventuate in even more undesirable situations.

The patient, instead of being referred to a better qualified physician in this field is given no advice, whereupon he grav-

ites toward an inferior physician, less concerned with the lack of qualifications. The extent to which lack of qualifications in occupational disease work may go is reflected in the fact that recently a duly licensed physician in the State of Michigan reported "intestinal peristalsis" as a diagnosis of an occupational disease.

While the unwillingness of a physician to accept responsibility for pathologic states in which he is not conversant is commendable, there still remains a duty to direct his patient into channels wherein adequate services may be procured.

Industrial Terminology

One of the most annoying handicaps in establishing the exact etiology of a possible occupational disease resides in the widespread practice of industry in using code symbols in the designation of its substances. In inquiry, the patient may state to his physician that his work consists of filling containers with "B-72." But, inquires the physician, "What is B-72?" The patient continues, "B-72 is a mixture of M-20 with 40 and L-97." Completely the physician is left in the dark, but if the truth were known it might be shown that this patient is engaged in the filling of cans with a grish remover, which consists of a mixture of wood alcohol, benzol and a synthetic wax.

Such situations may become so confusing that it may be almost impossible for a physician to obtain proper information as to work exposures. Medical, safety, social service or insurance departments all may have difficulty in obtaining full information as to actual chemicals and mixtures of chemicals designated in production relations only by code numbers.

The Absence of Records

The majority of industrial plants fail to maintain sufficient medical and work records to serve the physician properly in connection with occupational disease work. In a given instance an afflicted workman may give as his occupation some innocuous job as "elevator operator." He may remember that the job before that was as a truck driver. There his memory may fail. His work record may show no item of transfer within the factory of his employment and no record of any previous employments. Although the x-ray

of the chest of this workman may strongly suggest the possibility of silicosis, nowhere on the work record may it be shown that for a period of seven years at some much earlier time this workman was employed as a laborer in a pottery.

In this same connection it should be emphasized that one of the many handicaps to the physician in making an accurate diagnosis is to be found in the widespread practice of hospitals, of clinics, insurance records, etc., in merely naming the trade of a workman rather than describing his exact occupation. It is quite insufficient for medical purposes for a record merely to show, for example, that the patient was employed as an "automobile worker." Under this heading, there are perhaps not less than 200 different and dissimilar types of employment leading to different exposures, such for example as to silica in the foundry, cyanide in the heat treating room, chromium in the plating department, lead in body finishing, and on and on.

Lack of Library Facilities

With some temerity the statement is made that regardless of many book publications in the field of industrial hygiene and occupational diseases, special magazines, and articles appearing in general medical magazine publications, there is, at this time, no condensed, informative material on occupational diseases well suited to the needs of the family practitioner.

It is of course impossible and undesirable that any attempt should be made to reduce all of the lore of occupational diseases to some thin book to which the practitioner may refer and with certainty obtain all the guidance needed in the treatment and management of occupational diseases. Granting all this, there still is occasion to assert that a real need now exists for a book publication on occupational diseases designed for services to the neighborhood physician who in the aggregate sees far more occupational disease cases than the small number of specialists in this field.

Attitude Toward Industrial Medicine

In times long ago, when mine workings, sawmills, and railroad construction camps were established in remote sections of the country, far removed from the usual sources of medical services, it became necessary that the management bring into these iso-

lated work places a physician who might carry out all manner of medical services. These physicians set the broken arms of injured miners; delivered the babies of the miners' wives; treated the miners' children for measles and mumps and otherwise attempted to meet the medical needs of these detached communities. Usually the companies contributed to the income of these physicians and every family and every single man was taxed a stipulated sum each month in order to cover the physician's salary. Thus arose the term "Contract Physician." This perhaps did not always represent the best of medicine and not in all instances were these contract physicians of the highest type.

Later some of these communities became larger towns, or cities, and other physicians sought to gain a livelihood, only to find that the contract physician was in the saddle. This gave rise to complaint and out of this "Pandora's box" have come innumerable evils that even to this day attend the highest type of industrial medical supervision under the most ethical and commendable circumstances. It has become a tradition on the part of many of the medical profession to blame almost any manner of their economic difficulties upon industrial physicians. So real is this dissatisfaction that some organized medical groups have sought to legislate against almost any form of industrial medical practice and in some instances to deny membership in medical societies to industrial physicians. As a result, industrial physicians in some respects have been branded with a scarlet letter.

This queer situation, strange to say, may serve as a handicap in the diagnosis of occupational diseases, since some of the best physicians, and particularly the more timid ones, fear lest they may become besmirched by cooperating in this type of medical endeavor and to some extent shun any close affiliation that might lead to lifted eyebrows by those regarded as the leaders of the profession.

Now that the American Medical Association is somewhat alert to this situation and has organized a Council on Industrial Health, including some members with industrial medical experience, it is to be hoped that after all the industrial physician may become respectable.

New Chemicals

A further deterrent to accurate diagnosis of occupational diseases is linked up with an almost endless flow of new chemicals into industry's processes. Year by year, a far greater number of new chemicals are introduced than the number of investigations referable to their toxicity. It is often true that nowhere in the entire literature concerned with industrial toxicology may any word be found aiding the physician in determining if a given chemical might be responsible for a series of objective and subjective symptoms in any patient. One of the most desirable changes needed in connection with worker health protection is the requirement that no new substance be introduced into industry on a production basis until it shall have been established to the extent possible, through animal experimentation, that such a substance is without dangerous potentialities.

Significance of Handicaps in Diagnosis

A recital of the type just presented might be continued almost indefinitely, but perhaps without profit. The entire situation may be summarized by stating that whereas occupational diseases themselves are probably as diagnosable as any other difficult class of diseases, just about every stumbling block that may be produced is laid at the door of the physician sincerely seeking to acquire sufficient evidence upon which to make exact diagnostic decision. The greater number of these stumbling blocks represent no willful desire to hamper the physician, but instead arise from the results of peculiar circumstances that in some measure separate industrial diseases from the general run of afflictions.

As a consequence, large numbers of unwarranted diagnoses of occupational diseases have been made and are being made. Scores of suits have been instituted and some have been won by claimants whose claims possess no whit of merit, chiefly because well meaning physicians unhappily implanted the seed of possibility that his disease might have been caused by work and that the responsibility might be laid at the door of the employer. While the results may have appeared to work an injustice and monetary loss upon the employer, in the long run the interests of the worker himself are not served by these

spurious claims predicated upon improper medical advice. The usual trial of an occupational disease case is a travesty. The bombastic statements of some physicians, unattended by any iota of fact, bring into disrepute the entire medical profession and take away its time honored traditions of integrity and skill.

A further significance in the misdiagnosis of occupational diseases on the part of physicians is to be found in unwarranted hardships imposed upon employers. Recently a physician made a diagnosis of silicosis in two workmen in a given department. As a result, widespread apprehensions arose among the remaining workers, strikers were threatened, talk developed as to demands for high wages because of unusual exposures and the expectancy of a short work life. The employer was compelled to spend some \$85,000 in the installation of an elaborate dust control system.

As a matter of fact, these two workmen did not suffer from silicosis, were not in any wise disabled, had never been exposed to silica; no silica or any other harmful dusts were created. There was no need for the expensive installation made and contrariwise other departments did present practical exposures for which this \$85,000 might have been spent to better advantage in procurement of needed protection.

The Road to Betterment

This entire discussion would be without any value if present day practices and situations only were condemned. More accurate diagnoses as to occupational diseases are badly needed. These better diagnoses will come in proportion to the extent that the changes now listed are brought to actuality.

(a) The general level of knowledge of occupational diseases on the part of the medical profession should be increased through the introduction into medical college training of a practical amount of instruction on industrial hygiene and occupational diseases furnished by men who have had first hand experience in this field and are not wholly dependent upon textbooks. However, it is emphasized that in undergraduate medical training this form of instruction necessarily must be sharply limited because of a crowded curriculum, it conversely more extensive instruction is

badly needed under postgraduate auspices.

(b) In every industrial community, or at least in every industrial state, there should be available for cooperation with the general medical profession a number of much experienced and highly skilled occupational disease consultants, who, through limiting their professional activities to this one aspect of medicine, may become highly proficient in the solution of occupational disease enigmas.

(c) In every state and in some of the larger industrial cities, there should be maintained public institutions devoted to industrial hygiene and occupational diseases whose technical services may be available to the physician in charge of patients who may be suffering from occupational diseases, and these public bureaus should serve as fact finding bodies, equally interested in the worker and his employer.

(d) Much will be gained if all physicians responsible for the health of industrial workers in any capacity may make greater effort to obtain precise work histories, both present and past, and may seek to gain an adequate understanding as to the work environment, its materials, machinery and possible exposures.

(e) Controversies should be eliminated in the largest possible measure from occupational disease work. Many able physicians eschew all connections with this type of medical practice because of the sad experience that nearly every case may be so involved in controversy, litigation, dissatisfaction, until the good physician may feel that he may be degraded.

(f) A need exists for greater disclosure to physicians of the chemical nature of work material, to the harmful nature of which employees may be subjected. Industry may have excellent reasons for hiding the nature of some of its chemical materials under code terms, but more often these code terms are designed only for convenience and not for secret formulae purposes. A greater degree of cooperation on the part of the manufacturer will eventuate in the better health protection of his workers through the more intelligent ministrations of the patient's physician.

(g) Lastly, it may be pointed out that better diagnoses of occupational diseases will come when the general medical pro-

fession, through its organizations, shall alter its attitude toward industrial medicine, shall recognize this type of work as just the antithesis of the undesirable aspects of state medicine, and may come to realize that industry, under the guidance of able medical directors, is the meritorious source of numerous cases to be referred

to almost every specialty in medicine. The organized medical profession wholeheartedly should render its approval and support to the efforts of the physicians earnestly seeking to protect workers from the dangers connected with industry's thousand of substances and work conditions.

Necessity for Uniform Absentecism Record In the Industrial Health Program

By MILTON H. KRONENBERG, M.D.

Chief, Division of Industrial Hygiene, Department of Public Health, State of Illinois, Chicago

You are all aware of the value of accident statistics. You know that without frequency and severity rates there would be no solution of the safety problem and we would be groping in the dark. But, since they are available, we know where corrective measures are needed and this affords us an opportunity to correctly judge the value of one method of prevention over another.

Today, the grip of statistical methods is closing down upon industry, medicine, public health and safety. Vital statistics, however imperfect, are one of the chief means now available for measuring health, longevity and the progress of medical services in the battle against diseases.

So well recognized is this fundamental principle that the effectiveness of a city or state health department is judged, in a large measure, by the accuracy and completeness of its morbidity and mortality reports and records.

The same principle obviously should hold true for the groups of workers employed in a factory, mine, quarry, public utility or department store.

These records are of value not so much to indicate what has been done, although this is important enough in demonstrating to management the value of certain work and, therefore, the advisability of continuing it, as they are to chart future action.

Insufficient data have thus far prevented the recognition of some health problems peculiar to wage earners and there is ample evidence to indicate that morbidity and mortality rates are higher for some groups.

These excessive rates are especially notable for unskilled workers as shown in the accompanying table.

These death rates could only have been prepared by statistical methods of analysis and, therefore, clearly point out one phase of our problem lies. If nothing more than this we would find plenty to do trying to uncover the means to health among the unskilled group-workers.

The morbidity and mortality data down by uniform and adequate reports of cases can also serve as a basis for prevention and health education among workers, the same as is and has been done in accidents.

It may interest you to know that Eastman Kodak Company, Edison Electric Illuminating Company, Hood Rubber Company, Westinghouse, Metropolitan Life Insurance Company, General Motors, and several others have years made sickness studies with the aid of statistical methods. In this way they were able to evaluate the different problems confronting them and those requiring attention, and at the same time these sickness records properly applied and evaluated, they were able to cut their employees regarding digestive cases, colds, pneumonia, tuberculosis, cancer, skin disorders, as well as other ailments.

Furthermore, studies conducted in specific industrial undertakings have shown the value of statistical methods in revealing the incidence of such diseases as monia, tuberculosis, and degenerative

of the symptoms experienced by the patient should be recorded. The point is that facts should be recorded and not guesses. It is more important, for example, to know that ten men in a given occupation were disabled by "pain in the stomach" than to get ten different guesses of the disease or ailment causing the pain. Another item of importance on the record is "by whom diagnosed," and should show whether the diagnosis was made by the family physician, plant physician, nurse or the patient himself. Under "termination" of case, one should record whether the illness terminated in recovery, death, relapse or ended in a chronic condition.

The following statistical information and data are, therefore, possible if the items listed in the slide just shown you are carefully prepared.

1. The frequency or severity rate of any

given disease for the entire plant, individual departments or occupations.

2. The time lost due to any given disease or to all diseases combined in the entire plant or by departments or occupation.

3. The mortality rate.

4. The case fatality rate, expressed as the percentage of cases of a given disease which terminates fatally.

The intelligent application of preventive measures, of control, of health preservation must have statistics and they will always be an integral part in the solution of any problem. That it holds true in industrial hygiene is represented in my next slide which shows that the strength of any wheel is dependent on each and every spoke and each is dependent upon the other, otherwise your structure is unbalanced or collapses.

ADJOURNMENT

Steam Railroad

TUESDAY AFTERNOON SESSION

October 11, 1938

The first meeting of delegates to the Steam Railroad Sessions was called to order by Mr. W. W. Wood, Superintendent of Safety and Welfare, Baltimore & Ohio Railroad Company, Baltimore, Maryland,

who presided. Chairman Wood briefly outlined the significance of the programs of the two sessions planned, and then introduced the first speaker.

"Hidden Causes"

By FRED W. SARGENT

President, Chicago and North Western Railway Company, Chicago

We have seen the evolutionary growth of accident prevention work from its inception, as applied to the American railroads. Many of us here knew Mr. Ralph C. Richards intimately, and discussed his hopes and ambitions with him frequently. Though he met from time to time with discouraging results, yet he never surrendered. He laid the foundation for safety work that is vastly enlarged and is rapidly ripening into collateral lines that are of benefit not only to employees and managements but to the entire economic and social structure of the country.

In the beginning, and even until rather recent times, the greatest emphasis was laid upon working rules and physical conditions of plant and facilities; in other words, a safe place to work. There was every reason in the world why the greatest emphasis should be placed upon these factors, and, indeed, we are not yet so far along that we can afford to lessen our efforts with relation to these matters.

In the beginning, the idea of a surgical department was to care for men and women after they were injured. Gradually this conception has been enlarging and changing into a broader field and greater service, if a greater service is possible. This department no longer has as its sole objective the healing of wounds and the saving of human lives after injuries. Gradually,

steadily, the whole conception of safety work has progressed and evolved until today it has become a nationwide activity, drawing to its cause the best minds and the finest characters in our social structure. And with this greater interest in the work it has been but natural that the whole scope, theory and conception of the undertaking should gradually enlarge to embrace the wider field of accident prevention, to which I am about to refer.

In recent years many of the railroads have enlarged their conception of this work and have come to the realization that safety work involves not only safe tools, safe way and structures, and safe surroundings, but involves likewise, and with equal importance, the very physical and mental condition and attitude of the employee or officer himself. With this thought in mind we have changed the title of the head of our surgical organization from that of "Chief Surgeon" to that of "Medical Director," because if men are to avoid accidents we know that they must not only be surrounded with safe working rules and safe working conditions, but they themselves must be physically and mentally fit; and that the so-called human element, always and ever present, must constantly be reckoned with if we are to achieve the ultimate beneficial results so earnestly desired.

And so it is that in all this work, whether

to view (on railroad right of way) be permitted when fences are removed.

Nothing should be given of trains by sounding the horn in accordance with the law regulations.

of these requirements will themselves stop crossing accidents only an aid to a general

Responsibility

are involved in 90 per cent of all accidents. Since there are 232,002 automobiles and 232,002 railroads, the opportunity for accidents is apparent. The public, however, has a definite responsibility in the enforcement of such regulations.

Section of motor vehicles and cars will be barred from

of the licensing of those mentally and physically and those with a record of accidents will not be permitted to

of the highways not only at grade crossings but involves that the way is opening to cross the tracks. Clearly show that the railroads have their opportunity for progress in reducing accidents. However, they have the motorists and they are reaching in an effective manner. It is necessary that the cooperation of state and officers in policing the crossings in connection with rules on the streets and

plan of this nature—beads and the public—would effective means of checking reckless driving over

The railroads as a rule taxpayers in the cities and which they operate and are operation.

ies in education and law enforcement is merely a method

of informing the public as to the number of accidents, their causes and how they may be avoided. With this limited application of effort, automobile accidents of all kinds have been constantly increasing. We have found in our efforts to prevent accidents to employees that we must supplement our educational methods with rules regulating the conduct of the individual and that such rules to be effective must be enforced. It

is imperative that a similar procedure be followed if we are to curb the recklessness inherent in certain motor drivers.

Ninety-five per cent of the motor drivers of this country are competent and careful. It is to them that we appeal to aid us in the enforcement of such rules and regulations as are necessary to eliminate from our highways the one and one-half million drivers who are reckless and incompetent.

THURSDAY AFTERNOON SESSION

October 13, 1938

Safety and Public Relations

By ROBERT S. HENRY

Assistant to the President, Association of American Railroads, Washington, D. C.

The safety movement, which constitutes one of the proudest chapters of American industrial achievement, naturally falls into two main divisions. Safe conditions must be created, in the first place, but there must be also created a safe state of mind.

No doubt the pioneers of the safety movement encountered industrial managers willing enough to install safe equipment, but skeptical as to the need or the value of the education and exhortation needed to install safe ways of thinking. Every man knows that to get hurt will cost him time and money and suffering, these skeptics might have said, so what's the use of going to a lot of trouble to tell him so? He'll take care of himself!

Fortunately, the safety pioneers realized that safety was a matter of the minds of men just as much as a matter of machines, and that the safest equipment and the safest rules did not, in and of themselves, make a safe man. They fought their battle for safety on both fronts—safe conditions, yes, but safe thinking as well, achieved through constant iteration and reiteration of simple principles.

The early leaders of the safety movement pioneered in a field broader than their direct goal of promoting personal safety. They pioneered in the field of securing and organizing the wide-spread understanding and cooperation without which their movement must have failed of its

full measure of success. How well they and their successors did the job is told in the statistics of declining accident rates, of lives and limbs saved.

In these latter years, American industry is faced with the need for another sort of understanding and cooperation on the part not only of those employed but of the whole public which our industry serves.

In the short space of little more than a century, our American scheme of enterprise has settled and civilized a continent. It has made possible a standard of material plenty and well-being unknown before in the history of the world, and unknown elsewhere in the world today. We are told that one-third of the people of the nation are ill-fed, ill-housed and ill-clothed, but it should be borne in mind that when this American way of enterprise began to function a century and a half ago, practically the whole population was ill-fed, ill-housed and ill-clothed, according to our modern standards. Mistakes have been made, perfection is a long way off, but there is in the record of achievement much solid ground for pride.

Today, as never before, the best operation, the safe functioning, the very existence of the vast and varied organization of our economy of free enterprise, depend upon public understanding and appreciation of what it is, what it does, how it works, what it means to all of us.

The safety movement is built upon safe

- *W. H. GREENWALT, Murray Wood Products Co., Memphis, Tenn.
- *HARRY GUILBERT, The Pullman Co., Chicago, Ill.
- *ROLAND JONES, The Surtz Manufacturing Co., Chicago, Ill.
- *HARRY J. KELLEY, American Seating Co., Grand Rapids, Mich.
- *WALTER S. PAINE, Aetna Casualty & Surety Co., Hartford, Conn.
- *J. A. PERDUE, Michigan Mutual Liability Co., Detroit, Mich.
- *G. E. SANFORD, General Electric Co., Schenectady, N. Y.
- *H. E. SELLY, The Brunswick-Balke-Collender Co., Chicago, Ill.
- *Past General Chairman

MONDAY AFTERNOON SESSION

October 10, 1938

The first session was called to order by General Chairman H. E. Seely, Insurance Department Manager, The Brunswick-Balke-Collender Company, Chicago. He sketched in his opening remarks the prog-

ress of the Section during the past year, spoke of the good work of all Officers and Chairmen of Committees of the Section, and then introduced the first speaker.

Wood Dust Hazards Control

By H. H. VALIQUET

Ventilating Engineer, Employers Mutual Liability Insurance Company of Wausau, Wis.

Wood dust is a by-product of almost all woodworking operations including chipping and barking in the wood pulp plant and finishing wooden parts by sanding or sawing in sash and door, furniture, box, toy, and veneer factories. Processing in wood flour plants and the use of wood dust in the plastic and linoleum industries also present a dust problem. Since wood dust introduces the hazard of explosion and fire, dust control at the source is essential.

The first attempt at wood dust control in this country was made in about 1850 near North Conway, New Hampshire, where B. F. Sturtevant was making wooden pegs for shoes. To handle the refuse, he devised a *housed centrifugal fan to blow the trash away from the point of generation to a disposal.*

Not until about 1906 did capacity tables for centrifugal fans become available and methods of dust control begin to develop. Today the degree of dust control can be relatively adequate even though we have no definite standards by which we can judge results.

I hope, however, to outline a general

dust control program which will apply to most woodworking plants.

Removal of wood dust at the source is the prime consideration. We must not overlook the fact that some plants spend large sums of money for dust control. In the R. C. A. Victor Company's radio cabinet plant at Camden, New Jersey, 1 1/4 million cubic feet of air per minute are used to handle the trash, conveying tons and tons of refuse to disposal from woodworking facilities. Ford Motor Company, Fisher Body, Briggs, the Mengel Company, Westinghouse, General Electric Company, Globe-Werneck and others are doing an extensive job of controlling dust at its source.

In the near future we hope to see the average and small plant provided with facilities for wood dust control and safeguarded in this way from fires and explosions such as the following.

In a Detroit woodworking plant a steam pipe passed through a brick flue used to convey trash from various floors to the point of disposal. Some flammable dust thrown down the flue ignited, and the explosion resulted in injury to eleven men.

Another accident occurred in a sander finishing room at Appleton, Wisconsin, where wood dust on rafters became dislodged and fell onto live coals that had accidentally rolled out of a stove onto the hearth.

An open lantern similar to those commonly used by night watchmen, a leaky dust pipe which caused a dust cloud in an engine room, sparks drawn from a grinder into a dust collecting system, spontaneous combustion of an oily rag, and back fire through a furnace feeder pipe which started fire in a shavings storage vault, are a few causes of destruction and suffering.

Static electricity is a hazard in industrial plants, particularly where flammable dusts or gases are present. Not every individual discharge of static electricity will ignite a dust or gas mixture because the ignition depends upon the nature of the flammable material, the amount of it which is mixed with the air at the point of static discharge, and the nature of the static discharge.

Carbonaceous dusts are explosive, and the enormously increased electrical capacity of matter in a finely divided condition is often a contributory cause of the explosion of combustible dust. Twenty per cent of a sample tested was of a fineness to pass through 200 mesh screen. Such particles are about 3/1000 of an inch, or 74 microns, in greatest dimension.

Wood subjected to prolonged exposure to temperatures of a low order (such as that of steam pipes) may ignite spontaneously. Wood flour ignites at a temperature no higher than that of a lighted match.

The exact combination of dust concentration, flame temperature, etc. may seldom occur. Reasonably safe conditions are the important criteria, and to make conditions safe we must have good housekeeping and carefully observed safety precautions.

Four steps are necessary: (1) Enclose the operation; (2) Ventilate at the source of the dust; (3) Remove possible sources of ignition; (4) Provide safe disposal of waste.

As an example of enclosing operations, we found a vertical sander belt completely hooded. The dust control here was good because ventilation was effective at the point of dust generation. However, even this set-up was not functioning correctly for, in the first place, the fan was running in the wrong direction, and in the second place, its speed was not sufficient to add effort to the

air movement because its discharge was connected to a dust disposal system already stronger than the fan effort. The suction of the main system was greater than that of the small fan in line with the vertical sander; therefore, the fan acted like a valve and restricted the natural flow of air and dust.

This was an example of lack of thorough analysis of the facts. The hood was good, but the ventilation was poor.

In another case we found a vertical sander under partial enclosure with sub-standard dust control. The lower side of the belt should have been enclosed with the top and bottom pulleys. Not all the dust could be caught because a large section of the belt was not enclosed. To finish completely such a crooked piece of wood as a bow lack of a chair, a large opening is necessary. The hood which is more nearly enclosed furnishes the best dust control for most work.

A much neglected unit from the standpoint of dust control is the wood sander. A hood developed by the Sheboygan Fibre Furniture Company not only accommodates awkward work, but produces excellent dust control. Unfavorable drafts cause little interference with the mechanical ventilation. A 5 inch pipe connection has 2.5 inches total suction (inches of water). This reading is taken 12 inches from the hood through a 1/4 inch clean drilled hole in 5 inch pipe. Such a suction would indicate that results on the 24 inch drum are excellent.

A horizontal sander should have as complete enclosure of sander belt as possible. Such a device used by Kirk and Blum of Cincinnati is very satisfactory.

Too many belts lack enclosing hoods and good ventilation. The cost of the sheet metal enclosure, once it is installed, is amortized over the usual period for such major expenses; but ventilation equipment costs money day in and day out as long as it is in operation. Consequently, ventilation carried on without an enclosing hood is more expensive and less satisfactory than ventilation carried on within a suitable hood.

When a belt sander is completely covered except at the point of operation, ventilation applied parallel to belt movement produces reasonable dust control. Not enough sander belts are guarded for dust control, but we are fast approaching the time when tentative hood standards should be set.

A novel arrangement of dust control on horizontal sanders is often effective where a small high speed fan exhaust with a bag separator is attached at the sander belt. I have watched these units in operation, and the results seem to justify further study by industrial hygienists. The amount of ventilation of these units corresponds with usual standards, and the general results are entirely satisfactory.

Another horizontal sander belt is used in such a manner that it is almost impossible to obtain adequate dust control. The trouble is caused by a belt which is so short that an exhaust hood cannot be inserted between the two workmen who face each other as they sand small cedar boxes. The operator nearest the ventilated hood receives dust produced by the other workmen. With several machines of this type good housekeeping is almost impossible, and materials in transit are coated with fine dust which interferes with spray finishing. I refer to this bad practice to show how difficult it is to obtain dust control where two operations are conducted simultaneously and without ventilation on one sander belt.

A disc sander lends itself poorly to dust control and we despaired of ever getting results until we tried a cut-off like that used on centrifugal fans. A hood developed by Vilter Manufacturing Company for their pattern shop has accomplished this cut-off and deserves to be copied. The wheel rotates counter-clockwise through a hood sealed by flexible connection beneath the platten. To the hood a free unobstructed entrance for dust is maintained up to the center of the disc. The cut-off section of the bottom hood, is beyond the center and has close clearance, keeps the air stream with its dust particles from returning to the point of operation.

This principle is successfully used on grinders and merits wider application. In addition, the hood conforms to a scroll discharge to the exhaust pipe where it connects with the hood. The adjustable upper section of the hood covers all of the disc not in actual use and it is sealed to vertical sideways to be dust tight. No exhaust is necessary in the upper movable section, as the wheel carries the dust to the bottom hood. When bulky work prohibits the use of such a sealed upper hood, adequate ventilation will work fairly well if the scroll principle is incorporated. The usual per-

ipheral type hood is only partially successful because the tangential dust discharge requires extremely high velocity of air exhaust to overcome the kinetic energy of the dust particle. One stream is at right angles to the other.

A vertical disc sander is provided with a vacuum producer and bag filter. Dust control appears to be satisfactory for incidental operations. No doubt 10 per cent of the smallest particles of dust pass through the meshes of cloth bag with the air. This is a convenient and, in some cases, adequate method of dust control and disposal for isolated and incidental operations.

In Wisconsin open filters, known as the blow-through type, are taboo. The bag filter and vent must be enclosed so that the fine particles can escape only outside of the occupied areas.

The best device for dust control of an oscillating sander head on vertical or horizontal spindle is a cabinet or booth type hood enclosure. The exhaust should be through a slot extending around the bottom of the enclosure on the sides and back. A velocity of 200 feet per minute through the front opening to the booth and of 2,500 feet per minute through the slot will produce good control in a cabinet 52 inches long and 36 inches high. Glass may be used to admit light if necessary. This is a good treatment, and shapers should be guarded the same as jig sanders are guarded.

A compressed air jet or baffle board will help deflect a stray cloud of refuse not otherwise caught by the hood.

Tumbling wooden parts in rotating enclosures with lava or pumice stones produce dusty atmospheres. These tumbling barrels should be enclosed in a cabinet and the cabinet should be ventilated by about four air changes per minute.

Veneer making creates another serious dust hazard. Fire hazards may be severe in this field if proper enclosures with adequate ventilation are not used. The saw, which is about five feet in diameter, passes through the sloping trough which sheds the dust from the rotating air blast and throws much of it to the six inch exhaust. Dust always escapes from these operations and good housekeeping is easier if the pit is enclosed.

I found slightly less than 15 per cent of all the dust particles from a re-saw on

veneer are finer than 100 mesh, and about 1 per cent are finer than 200 mesh.

Assuming that the sander and veneer operations are enclosed and ventilated, the next point to observe is the grounding of all points of static discharge. A driving belt grounded by a comb placed near the points where the belt leaves the pulleys, or two well-grounded wires placed $\frac{3}{4}$ inch away from the belt on both tight and loose sides will remove the static spark. Motor and sander frames, conveyers, and fans should all be grounded, and dust proof globes should be placed on the electric light bulbs to exclude dust from collecting on the hot surfaces.

The dust piping should be provided with relief caps and should have liberal relief areas on the upper cones of refuse traps and cyclone collectors. One square foot relief for 70 cubic feet cubical contents is considered adequate by government engineers.

The best system of safety piping I have seen has headers outside of the plant and short leads from machines rising through the roof or passing through the side wall to these headers. Such precautions are warranted in veneer plants of one story construction. No fire or fire resisting walls can be traversed unless fused automatic fire dampers are installed.

When the dust is out of the plant it should be mixed at the point of entrance to cyclone with coarse trash from such machines as planers, moulders, etc. Separation from air will be better where coarse and fine are mixed.

Back pressure valves are essential at the cyclone whether one or more pipes enter it.

Where no coarse trash is mixed with the fine dust, cloth bag arresters are recommended for dust control. The arresters should have explosion relief panels which are sealed by air suction and relieved by pressure. The cloth should be grounded electrically.

A barricade should guard the areas adjacent to reliefs so that reliefs do not contact passers by. The area of relief is not easily calculable. 60 per cent of one side and end is a reasonable calculation.

Return of the air to the occupied areas is possible, but only an experienced engineer should attempt it.

One plant in the east ran all the air from a refuse cyclone through a double bank air washer. They finally made their system work by installing a preliminary spray head in down comer from cyclones to washer. Before this spray head was installed the nozzles became plugged because fine dust collected on them and was pumped with the water through the nozzles. Another plant tried this same arrangement and failed entirely because of the tremendous overload of coarse refuse which spilled over from cyclones to air washers. Calculating the heat saved we find one million cubic feet of air per minute represents three tons of 10,000 B. T. U. coal per hour with 50 per cent efficiency, 50 degrees inside and 32 F. outside temperatures. This saving is interesting, but for small plants it would be insignificant especially when exhaust steam is available for heating purposes.

The feeding of coarse mixtures to dutch ovens or boiler settings is good practice provided transport air has been eliminated.

The use of an intermediate trap or valve will prevent sparks or hot gases from reaching the cyclone body or storage vault in which the atmosphere may very easily be of an explosive nature. But a choke must be maintained and, if necessary, ample gravity feed must be provided with an agitator.

Refuse from hogs should be handled separately because it is particularly susceptible to fire. Cyclones and pipings connected to a hog should have explosive heads. Every 40 feet there should be a relief head in a long distance blowing system except where a charger is used. In that case, the cyclone alone should be vented by relief on the upper cone.

Such cyclone may discharge directly to the furnace if a feed valve is used in the down spout to the furnace. Storage bins for hog trash should be isolated from any other storage of dust or trash because the danger of their catching fire is particularly great.

If such precautions as I have outlined are in use, we could eliminate other potential fire and explosion hazards by better housekeeping to remove the usual static dust awaiting ignition. Enclosing the source of the dust cloud and preventing ignition are the major contributions towards safety for workmen in the woodworking field.